Newtown Creek Superfund Site
Surface Sediment - Background Threshold Value Discussion
August 15, 2017

Presentation Overview

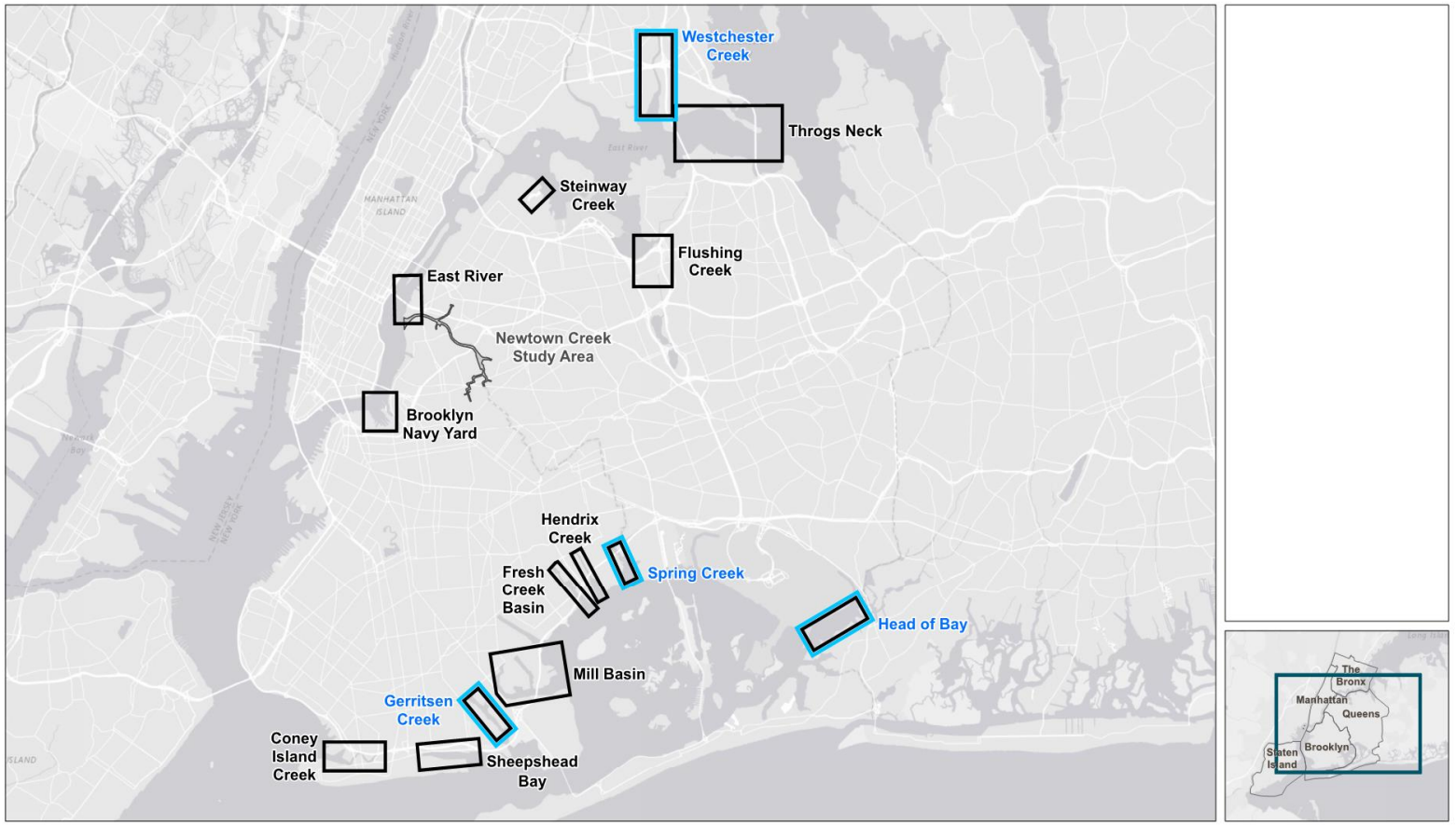
- Purpose: To promote discussion of background threshold values (BTV) for surface sediment
- Definitions – EPA Guidance
- Background/reference area data collected
- Process to evaluate BTVs
- Potential BTV values
- Discussion of BTVs

Background Definition

- Background
  - Substances or locations that are not influenced by the releases from a site and are usually described as naturally occurring or anthropogenic: (1) Naturally occurring substances present in the environment in forms that have not been influenced by human activity. (2) Anthropogenic substances are natural and human-made substances present in the environment as a result of human activities (not specifically related to the CERCLA site in question).

Source: Guidance for Comparing Background and Chemical Concentrations in Soil for CERCLA Sites, EPA 540-R-01-003, Sept. 2002.

Background Sampling Locations



Blue outline – Selected Reference area for BERA Source: Newtown Creek Draft RI Report, Anchor QEA.

Background Data Evaluated

- Phase 1 and Phase 2 surface sediment data
- Analytes – total PCBs (combined Aroclor and congeners), total PAHs (17), and copper
- Background area categories established during the RI
  - CSO/Industrial
  - CSO/Non-industrial
  - Non-CSO/ Industrial
  - Non-CSO/Non-industrial
- Also evaluated East River background locations
  - East River (upper and lower)
  - East River (all East River)

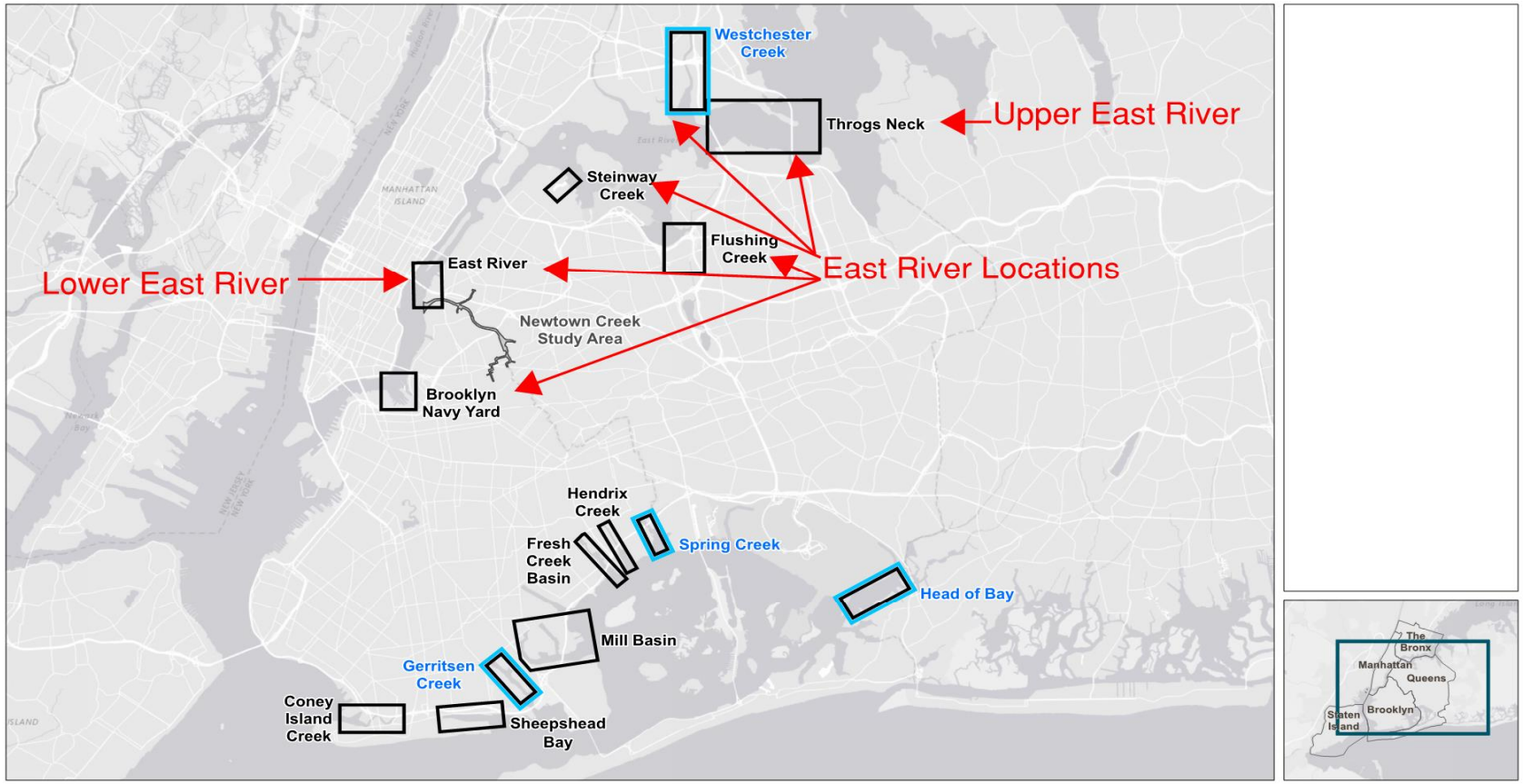
Background Sample Summary

Category	Count	Group	Count
CSO/Industrial	40	Brooklyn Navy Yard	8
		Coney Island Creek	8
		Flushing Creek	6
		Westchester Creek	18
CSO/Non-Industrial	31	Fresh Creek Basin	7
		Spring Creek	18
		Upper East River – Throgs Neck	6
Non-CSO/Industrial	39	Head of Bay	18
		Lower East River – Newtown Creek	6
		Mill Basin	8
		Steinway Creek	7
Non-CSO/Non-Industrial	33	Gerritsen Creek	18
		Hendrix Creek	7
		Sheepshead Bay	8

Background Sample Summary – East River

Category	Count	Group	Count
East River Locations	51	Brooklyn Navy Yard	8
		Flushing Creek	6
		Westchester Creek	18
		Upper East River – Throgs Neck	6
		Lower East River – Newtown Creek	6
		Steinway Creek	7
East River (Lower and Upper)	12	Upper East River – Throgs Neck	6
		Lower East River – Newtown Creek	6

East River Locations

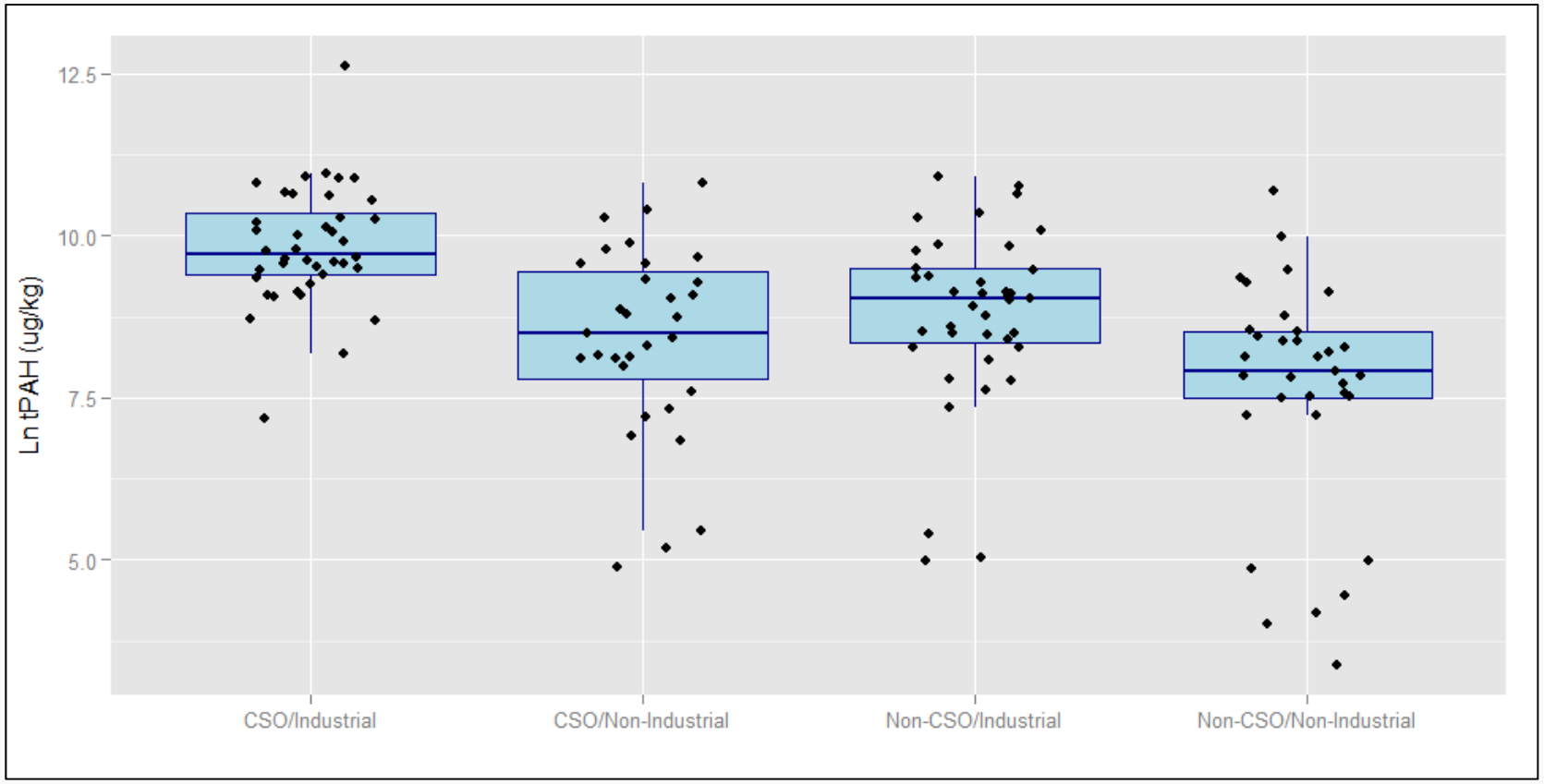


Blue outline – Selected Reference area for BERA Source: Newtown Creek Draft RI Report, Anchor QEA.

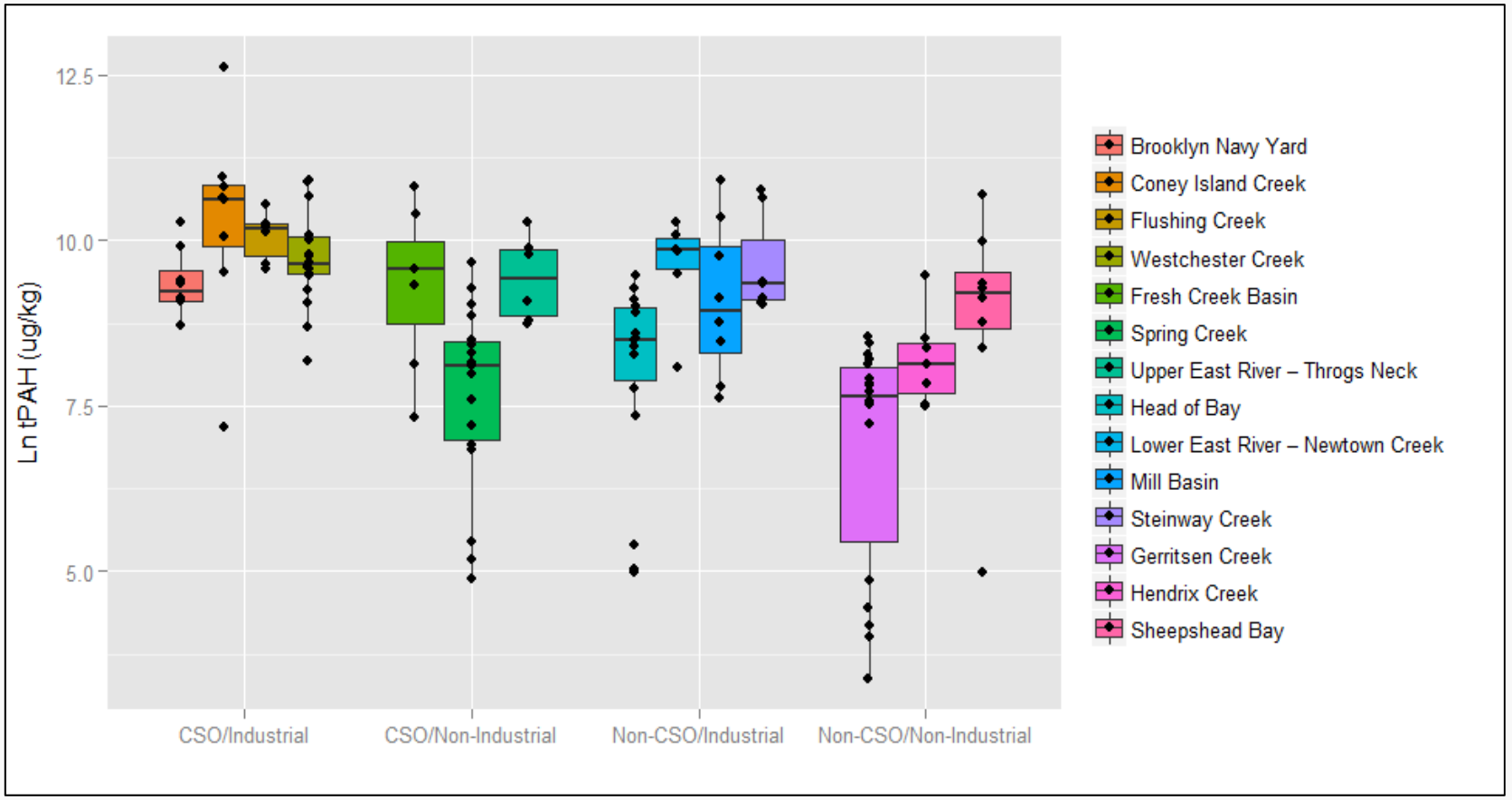
Background Data Evaluation Process

- Used Pro-UCL and R programs for statistical analysis
- Distributional analysis
- Outlier testing and removal of outliers
- Determine data distribution
- Comparison testing of data categories (e.g., CSO/Industrial vs. CSO non-industrial) for each analyte group (tPCBs, tPAHs, and copper)
- BTV calculation
- Evaluation of BTV values

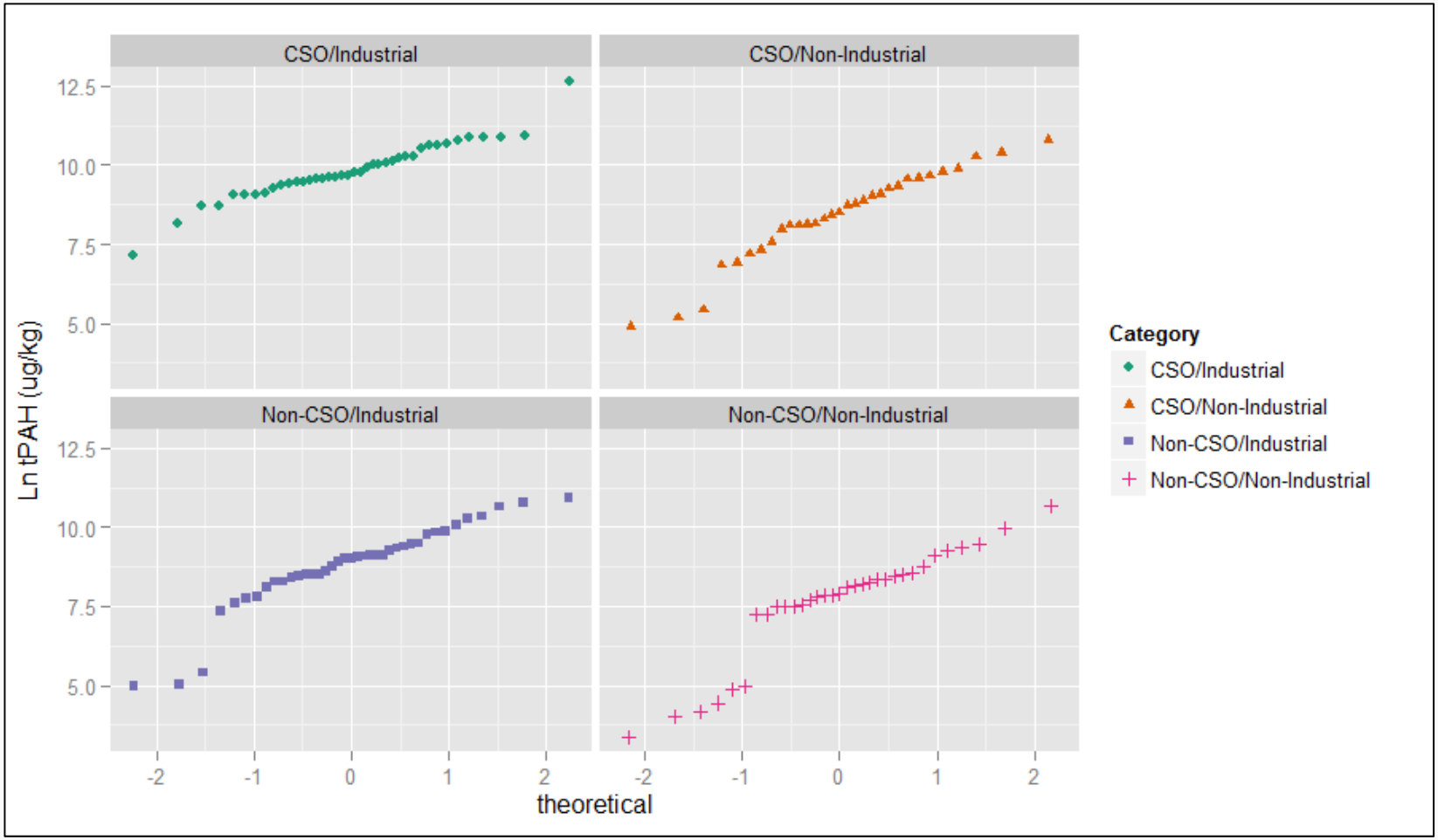
Box Plots - tPAH



Box Plots - tPAH



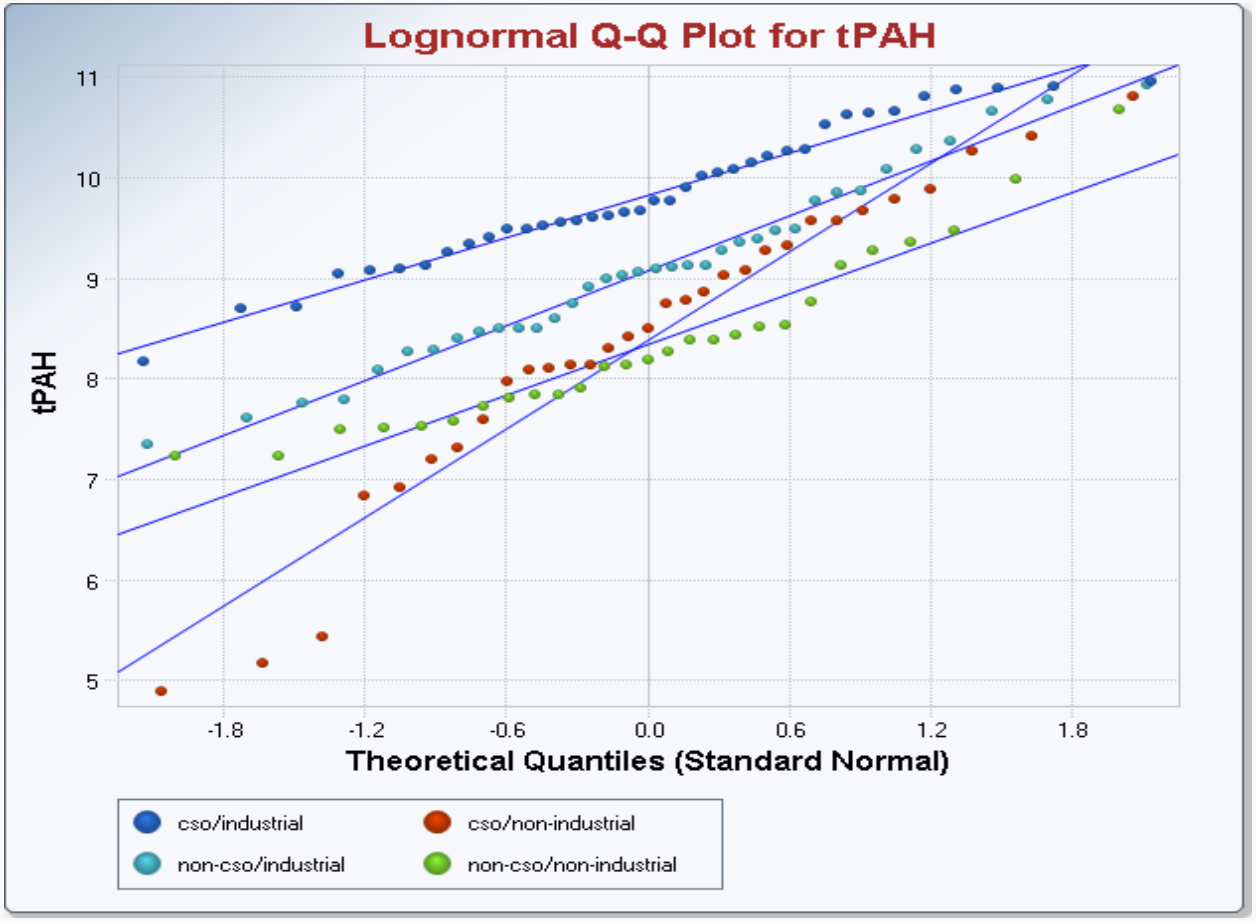
Q-Q Plots - tPAH



Outlier Testing

- Rosner method on log-transformed data
- Outliers identified
  - 10 tPAH
  - 6 tPCB
  - 10 copper
- Outliers represented the lowest concentrations in the four groups (one exception for tPAH)
- Outliers not identified in East River groupings
- Following outlier removal, all data groups passed the Shapiro-Wilk and Lilliefors test for normality on log-transformed data (p-values >0.05)

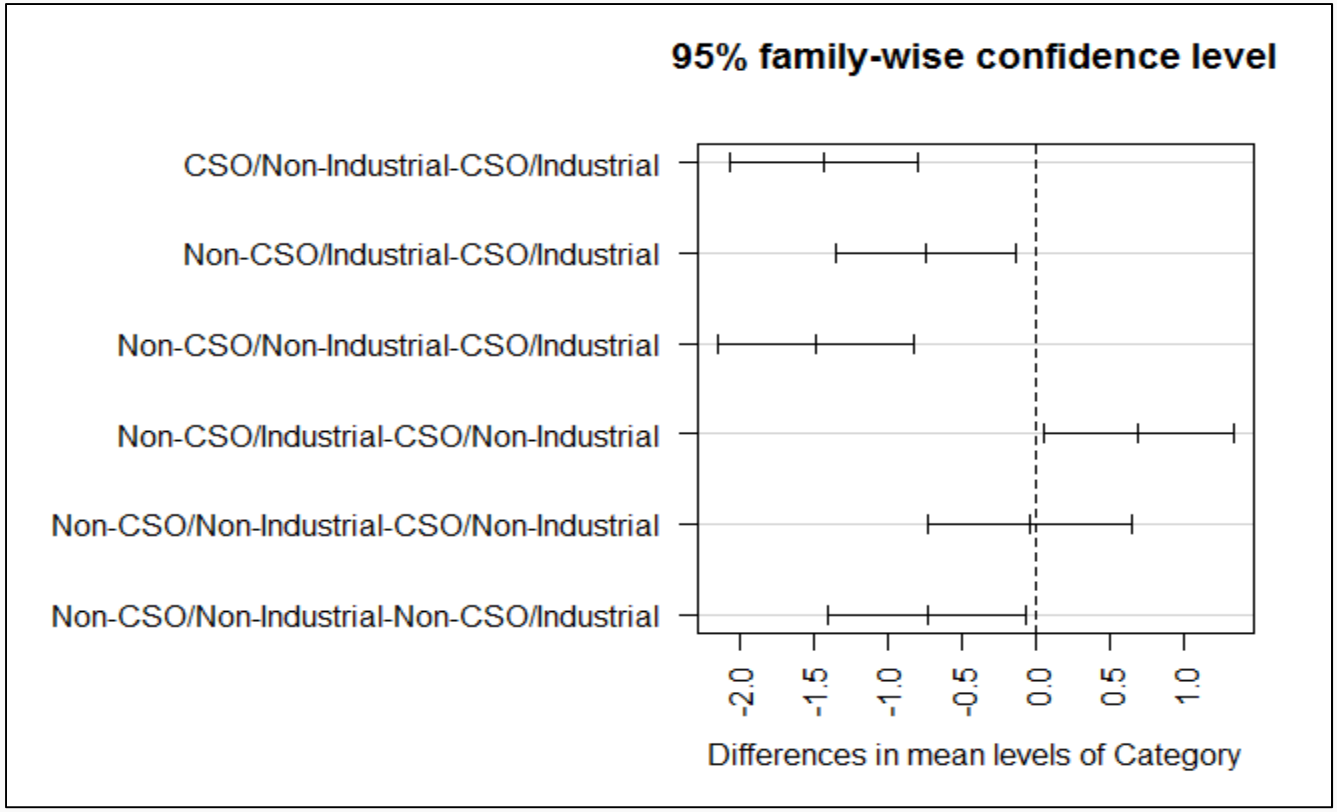
Q-Q plot - tPAH


Lognormal Q-Q Plot for tPAH
tPAH
11
10
9
8
7
6
5
-1.8
-1.2
-0.6
0.0
0.6
1.2
1.8
Theoretical Quantiles (Standard Normal)
cso/industrial
cso/non-industrial
non-cso/industrial
non-cso/non-industrial

Comparison Testing

- Data groups compared to determine statistical differences (i.e., are data from the same populations).
- Can data groups be combined
- Tested using ANOVA and Tukey HSD
- In general, groups should not be combined.

Example Comparison Test- tPAH



BTV Calculations

- Several methods available to calculate BTVs
- Upper Tolerance Level (UTL 95/95) –
- Upper Prediction Limit (UPL) 95% confidence
- USL – Upper Simultaneous Limit (USL)
- Maximum Values provided for comparison

Potential BTVs – tPAH, tPCB, Cu

Category	Limit	*k*	Copper mg/kg	tPAH ug/kg	tPCB ug/kg
CSO/Industrial	Max Value		449	57,055	875
	UTL 95		446	80,814	1257
	UPL	1	363	60,334	986
	USL	≤20	641	132,380	1956
CSO/Non-Industrial	Max Value		459	49,190	6265
	UTL 95		619	110,587	5161
	UPL	1	370	55,273	2330
	USL	≤20	1144	252,419	13,298
Non-CSO/Industrial	Max Value		314	55,075	1768
	UTL 95		389	60,016	1267
	UPL	1	292	40,636	842
	USL	≤20	594	109,870	2457
Non-CSO/Non-Industrial	Max Value		445	43,475	1645
	UTL 95		444	28,764	1439
	UPL	1	317	18,433	939
	USL	≤20	605	41,754	2199

Potential BTVs - East River

Category	Limit [1]	*k*	Copper mg/kg	tPAH ug/kg	tPCB ug/kg
East River Locations	Max Value		314	54,290	1768
	UTL 95		439	62,134	1573
	UPL	1	340	48,714	1154
	USL	≤20	839	114,729	3435
East River (Lower and Upper)	Max Value		122	28,939	378
	UTL 95		228	90,084	912
	UPL	1	134	49,445	452
	USL	≤20	173	65,929	633

Background Selection

- Some Considerations:
  - Newtown Creek is CSO/Industrial and is anticipated to continue to have industrial uses and CSO (although much reduced based on the LTCP).
  - Currently, a BTV based on the CSO/Industrial category data may be appropriate
  - As a future goal, with limited CSO, a BTV based on the Non-CSO/Industrial category data may be appropriate
  - Other factors to consider:
    - Risk Assessment Results
    - Risk Management
  - EPA is preparing a tech memo that will provide more detail on the evaluation of background data

Discussion/Questions